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ABSTRACT

A study investigated: (1) the degree of land grant institution involvement in economic development activity, defined in terms of 17 selected cooperative research and technology exchange activities; (2) changes in selected academic policies (patents, consulting, conflict of interest, conflict of commitment, and extra compensation); and (3) the factors responsible for encouraging or discouraging increased institutional involvement in economic development activity. It was hypothesized that size of operating budget, geographic region, and differences between historically black and other institutions would account for significant differences in level of involvement in economic development. Data were drawn from two surveys of the chief academic officers of the 71 United States land grant colleges and universities; missing and supplemental data were obtained from a reference publication. As of the time of preparation of this paper, neither data gathering nor analysis are yet complete, but results so far indicate increased institutional involvement in these institutions, which have a somewhat common charter mission emphasizing public service. However, the range of responses indicates that factors influencing such involvement varies considerably. Additional research, particularly regarding the possible link between increased involvement and expanded funding, is recommended. Includes 25 references. (MSE)

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Institutional Motivation and Policy Change Associated With Land Grant Institutions' Involvement in Economic Development

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ASSOCIATION FOR THE STUDY OF HIGHER EDUCATION

This paper was presented at the annual meeting of the Association for the Study of Higher Education held at the Red Lion-Jantzen Beach in Portland, Oregon, November 1-4, 1990. This paper was reviewed by ASHE and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC collection of ASHE conference papers.

Introduction

American colleges and universities are expected by many to be proactive in responding to local, state and national economic development and industrial competitiveness needs [10, 15, 17, 18, 23]. Industry-academe partnerships are touted in many quarters [8, 15, 20]. Such partnerships are not a new feature in American life but appear to be changing in character, extent of collaboration and in number [2, 16]. Colleges and universities are generally not seen as primary sources of new businesses yet they are regarded as key to the mix [12] which results in new or continuing prosperity in an increasingly information-based economy [10, 23], including manufacturing-oriented sub-economies [13].

Economic development is associated traditionally with econometric modeling and interventions in underdeveloped societies. It is a phrase and concept referenced with less precision today. A "process by which interested individuals and organizations are inspired to invest capital in an area" [17, p. 101] captures part of its current, more common usage. When associated with American higher education it appears to generally represent "a process of innovation that increases the capacity of individuals and organizations to produce goods and services and thereby create wealth" [23, p. x].

Academics have been engaged with their industry counterparts in active discussion about federal policy to guide commercial development of technologies [3, 20]. They appear also to be involved increasingly in similar local, regional and state-level policy making and the

implementation of specific economic development initiatives [4, 16, 23]. Advocates of increasing such involvement present a point of view well summarized in an SRI International, Public Policy Center, report:

> Higher education can meet the new demands imposed by government and industry in ways that enhance their traditional missions. Developing new roles that contribute to economic development can enable these institutions to develop new alliances with industry and government, expand their resource base, enhance their ability to attract and educate students, develop stimulating and useful research opportunities, and fulfill public service obligations [23, p. viii].

Coupling higher education involvement in economic development with the public service mission has been common [7, 23, 25] , particularly among land grant institutions. Land grant institutions were created through the Morrill Acts of 1862 and 1890 to train students in the agricultural and mechanic arts to meet the needs of industry and agricultural technology during that period [7]. University-industry technology development was fostered later through wartime research in the early to mid 20th century and continued with space exploration and military defense build-ups in the latter 20th century.

Most commentators recognize the distinct and differing points of view of each sector [2, 4, 24]. Some muse about whether the rise of activity and public discussion associated with campus-corporate partnerships is "another in a long line of educational fads" [4, p.

iii]. Others describe it as an important development but suggest that the exploitation of the higher education asset for economic development purposes is "improvised and shortsighted" [24, p. 113], requiring a more fundamental evaluation of its impact on major academic functions [10, 21, 24].

From a policy analysis perspective, Slaughter asserts that, although corporate/campus relationships are presented as reciprocal, "corporations actually dominate", the payoff for higher education being indistinct and somewhat distant, at best [22, pp. 186-187]. She also observes that the related policy literature offers little "empirical evidence of direct linkages between university research and industrial innovation" [22, p. 13]. Potential costs of campus/corporate relationships include threats to academic freedom, less open exchange of information, exacerbating the split between campus haves and have nots, conflict of commitment among the faculty, and subordination of fundamental institutional purposes [1, 2, 4, 8].

Limited empirical data appear available to inform decision-makers. A variety of factors are thought to stimulate interest in economic development among academic institutions. A National Science Foundation (NSF) sponsored survey of 39 universities and 56 companies reported in 1983 found diversifying the institution's funding base, student exposure to real-world research problems, and better overall training for graduates to be among the factors most often cited [20]. Institutional policy facilitative of faculty involvement in economic development activities is also considered to be an important factor

[9]. An American Association of State Colleges and Universities (AASCU) survey reported in 1986 indicated leadership, special resources and administrative flexibility to be among leading supportive factors [23].

Study Objectives

Three primary research questions guided the focus of this study:

1. To what extent are land grant institutions involved in economic development activity, defined operationally here in terms of 17 selected activities under the general description of cooperative research (4 activities) and technology exchange (13 activities)?
2. What, if any, change has occurred among selected academic policies associated with increasing institutional involvement in economic development activity, policies defined operationally here as patents, consulting, conflict of interest, conflict of commitment and extra compensation?
3. What are reported to be the factors responsible for encouraging (or discouraging) increased institutional involvement in economic development activity?

With regard to institutional involvement (question one), the variables of size (i.e., operating budget), region of the nation and differences between historically black and other land grant institutions were examined. It was hypothesized (and the literature implied) that each of these variables may account for significant differences in level of institutional involvement in economic

development.

The study is still in progress, including data collection. Later analysis will consider the three variables noted with regard to research questions two and three (policy change and factors motivating involvement). Also underway is an effort to aggregate subsets of like motivation factors (e.g., factors related to faculty, external influences, administration/board, finances, etc.) to determine if analysis of a smaller number of (composite) influential motivation factors is possible and warranted.

Methodology

Theoretical Framework

This study relies upon organizational theory associated with Perrow's linkage of the neo-Weberian bureaucratic model--"starting with the solid rock of bureaucracy" [19, p. 278]--and the power perspective of organizational analysis employed within "an expanded vision of the environment and externalities" [19, p. 278]. For the environment linkage Perrow relies largely upon the population-ecology model of organizations [6, 11].

This study is based on the assumption that organizational change occurs within a larger environment and is the result of the combination of pressures exerted from both within and outside the organization. Potentially influential factors (both internal and external) were identified and the direction of the pressure applied by each factor (encouraging, discouraging, or neutral) was determined.

Data Source

The data were gathered from chief academic officers of the 71 American land grant colleges and universities. Missing and supplemental data were obtained from a reference publication of the National Association of State Universities and Land-Grant Colleges (NASULGC) [14].

Data Collection

Two mail surveys were conducted: the first in December 1989 to February 1990 to gather responses related to institutional involvement in economic development and related academic policy change; the second in July to September 1990 to gather responses related to motivation factors and their influence upon discouraging or encouraging increased economic development activity. A 93 percent response rate was achieved in survey one; a 76 percent response rate in survey two, as of preparation of this paper. Matching respondents at this point in the data collection has yielded 51 usable responses (72%).

Findings

Neither data gathering nor analysis are yet complete. But sufficient data are available to support tentative findings.

Involvement in Economic Development

Table 1 summarizes responses to the 17 selected activities which defined "involvement". Responses indicate considerable variation among institutions, some very involved in virtually all specified activities, others involved in few, if any. The response means indicate greater involvement overall in activities such as industry-sponsored contract

TABLE 1

Summary of Institutional Involvement in Economic Development Among Land Grant Institutions for 17 Selected Activities (N=51)

		Frequency [a]		
	$\bar{x}$	Not at all Involved	Somewhat Involved	Very Involved
Economic development activities:				
Industry sponsored contract research	2.49	5	16	30
University/industry consulting relationships	2.39	3	25	23
Technology extension service	2.33	8	18	25
Industrial associates/liaison programs	2.14	8	27	15
Univ./industry cooperative seminars, speakers & publications	2.14	9	26	16
University/industry research agreements	2.14	14	16	21
Cooperative entrepreneural development	2.10	13	20	18
Research consortia	2.08	12	23	16
Efforts to inform faculty of commercial applica. of inventions	2.04	12	25	14
Industrial/research parks	1.86	23	12	16
Creation of new patent/licensing office	1.82	25	10	16
Use of outside patent management firm	1.82	22	16	13
Addition of staff to patent office	1.80	23	15	13
University/industry personnel exchange programs	1.78	14	34	3
PR campaign to inform potential licenses of available inventions	1.76	23	17	11
Creation of separate research corporation	1.71	29	8	14
Industrial incubators	1.71	26	14	11

[a] Scoring for calculation of mean: 1, not at all involved; 2, somewhat involved; 3, very involved.

research or technology extension and lower overall involvement in less traditional activities such as participation in an industrial incubator or personnel exchange programs with industry.

Given an apparent full continuum of "involvement" among institutions and the desire to examine level of involvement associated with other variables (size, region, historically black or other, academic policy change), an Economic Development Involvement (EDI) Score was devised (employed in Tables 2, 3, 4, 5).

Size of operating budget (Table 3) does appear related to level of involvement; larger institutions are more likely to be involved in economic development activities (tempered somewhat by overlapping EDI score ranges). Although significance is yet to be determined, there does also appear to be a pattern of variation of "involvement" associated with region see (Table 4, e.g., Great Lakes region institutions reporting high involvement in economic development, North East region, comparatively lower involvement). There also appears to be a pattern of differing involvement between historically black institutions and others (Table 5) of similar size (the only reasonable comparison given size findings reported in Table 3). Historically black institutions appear to be quite similar in involvement in economic development (having relatively low EDI scores).

Academic Policy Change

Table 2 indicates a relatively low correlation (r=0.379) between level of economic development activity and change among selected academic policies. The literature suggested that these variables would

TABLE 2

Involvement in Economic Development and Changes in Academic Policies Among Land Grant Institutions

(N=51)

Economic Development Involvement Score [a]	Policy Change Score	Academic Policies: Frequency of Change				
		Patents	Consulting	Conflict of Interest	Conflict of Commitment	Extra Compensation
50	0					
49	4	x	x	x	x	
47	4	x	x	x		x
46	2	x		x		
45	2	x			x	
45	2	x		x		
44	0					
43	1	x				
43	0					
43	3	x		x		x
42	3	x		x	x	
42	1	x				
41	1	x				
40	5	x	x	x	x	x
40	3	x		x	x	
40	2			x	x	
40	0					
39	3	x	x			x
39	2	x		x		
38	2		x	x		
38	1					x
37	1	x				
37	2	x	x			
35	1	x				
34	0					
33	3	x	x	x		
32	1	x				
32	1		x			
32	0					
31	1	x				
31	1	x				
30	0					
29	2	x				x
29	2	x				x
29	1		x			
29	0					
29	0					
29	0					
28	1	x				
27	0					
26	3	x		x		x
26	0					
25	2	x				x
23	3			x	x	x
23	1	x				
23	0					
23	0					
21	2		x	x		
21	0					
20	0					
20	0					
Sum per policy		27	10	15	7	10
(%) of policies changed		(39)	(15)	(22)	(10)	(15)

r=.379 at p<.01

[a] Based upon Table 1: calculated as sum of involvement ratings (1, not at all involved; 2, somewhat involved; 3, very involved) for each of 17 selected economic development activities. Possible range of high 51, low 17; actual range of 50 to 20.

TABLE 3

Economic Development Involvement by Size of Operating Budget (N=51)

Size of Operating Budget	No. of Institutions	Economic Development Involvement Score [a]	
		$\bar{x}$	Range
$500M-$1.5B	12	41.75	34-49
$250M-$500M	8	38.13	29-50
$100M-$249M	19	32.42	20-43
$6M-$99M	12	26.33	20-43

[a] See Table 2 for calculation of Economic Development Involvement Score.

TABLE 4

Economic Development Involvement by Region (N=51)

Region	No. of Institutions	Economic Development Involvement Score [a]	
		$\bar{x}$	Range
Great Lakes	4	40.25	37-44
South West	4	39.25	26-47
Mid East	5	39.20	30-49
South East	14	35.07	21-50
Rocky Mountains	3	34.67	29-43
Plains	7	32.85	23-43
Far West	6	31.50	23-39
North East	5	29.80	23-41
Outlying Territories	3	20.33	20-21

[a] See Table 2 for calculation of Economic Development Involvement Score.

NOTE: Regions are as delineated by NASULGC [14]. In order listed, states included are Great Lakes: (Illinois, Indiana, Michigan, Ohio, Wisconsin); South West (Arizona, New Mexico, Oklahoma, Texas); Mid East (Delaware, District of Columia, Maryland, New Jersey, New York, Pennsylvnania); South East (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia); Rocky Mountains (Colorado, Idaho, Montana, Utah, Wyoming); Plains (Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota); Far West (Alaska, California, Hawaii, Nevada, Oregon, Washington); North East (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont); Outlying Territories (Guam, Puerto Rico, Virgin Islands).

Table 5

Comparison of Economic Development Involvement Between Historically Black Land Grant Institutions and Other Land Grant Institutions (N=51)

	No. of Institutions	Economic Development Involvement Score [a]	
		$\bar{x}$	Range
Historically Black (All with operating budgets $6M-$99M)	7	25.00	21-30
Other (Operating budgets $6M-$99M)	5	30.4	20-43
Other (Operating budgets $6M-$1.5B)	44	35.52	20-50

[a] See Table 2 for calculation of Economic Development Involvement Score.

be correlated more highly. The opposite findings suggest that institutions may not be operating in a global way with regard to economic development and policy change, but instead dealing with individual issues in an isolated way. The weak correlation between these two variables may also be an indication that institutions already have policies in place and perceive them to be adequate. If an institution has an existing policy in an area such as consulting or conflict of interest, and the policy can be interpreted generally to protect the university and not be overly restrictive to faculty, the institution may see no need to develop a new policy, even though such a policy might specifically support increased activity in economic development.

Factors Influencing Economic Development Involvement

When asked to indicate generally the level of institutional involvement in economic development over the preceding three years, 86% (44) indicated it had increased (Table 6, note [a]). The extensive discussion suggesting increasing forms and number of campus/corporate liaisons appears to be well supported by general perceptions expressed among land grant institutions (although, as noted in discussion regarding Table 1, level of involvement varies greatly).

Influence factors. As summarized in Table 6, there is considerable variation reported in the extent to which factors influence institutions' decisions regarding economic development involvement. Factors such as point of view of the president, of the state government, of the legislators and the desire to increase

TABLE 6

Motivational Factors Influencing Economic Development Involvement (N=51)

	Influence Score [a]	Encouragement Score [b]	Frequency Encouraging	Discouraging	Neutral
Motivational factors:					
Point of view of institution president	3.90	45	45	0	5
Point of view of state government	3.86	45	45	0	4
Industry sponsored research	3.82	47	47	0	2
Point of view of legislators	3.76	45	45	0	5
Local, regional,state economic revitalization	3.53	43	43	0	6
Meeting public service obligations	3.43	39	40	1	9
Improving public relations, public image	3.41	39	40	1	9
Increasing state appropriations	3.39	32	35	3	11
Transfer of technology into commerce	3.39	40	40	0	8
Increasing corporate gifts	3.37	41	41	0	9
Credibility, acceptance w/in business community	3.34	37	40	3	7
Providing technical assist. to establ. companies	3.25	42	42	0	8
Enhancing overall research program	3.22	37	38	1	11
Institution's founding purposes, charter	3.22	29	30	1	18
Assisting start-up businesses	3.20	39	39	0	9
Point of view of local government	3.16	37	37	0	13
A strategic planning, long-term planning process	3.12	31	32	1	17
Improving research equipment	3.10	33	33	0	17
Point of view of board of trustees	3.10	30	30	0	20
Federally supported research	3.06	28	30	2	17
Generating new knowledge	3.00	27	29	2	18
Transmission of knowl. thru non-trad. teaching	2.98	36	37	1	12
Point of view of faculty	2.94	23	25	2	22
Faculty consulting activity	2.92	38	38	0	10
Accommodating faculty entrepreneurial activity	2.92	36	37	1	11
Enhancing faculty development	2.84	29	29	0	18
Open exchange of information	2.78	20	23	3	23
Recruiting, retaining faculty	2.78	30	31	1	17
Ability of faculty to augment base salaries	2.69	28	30	2	16
Fund raising among alumni and others	2.67	30	30	0	18
Better use of institution's real property	2.55	20	21	1	25
Academic freedom, freedom of inquiry	2.55	-3	8	11	28
Improving instructional equipment	2.55	23	24	1	23
Proprietary rights, secrecy regarding inventions	2.53	13	19	6	22
Point of view of alumni	2.51	24	24	0	24
Recruiting graduate students	2.49	17	18	1	29
Point of view of business leaders	2.47	45	45	0	5
Potential liabilities of commercialization	2.43	-3	10	13	24
Revenue generation through commercial ventures	2.41	25	28	3	20
Increasing faculty publishing activity	2.25	7	14	7	27
Transmission of knowledge through tradit. tchg.	2.24	13	15	2	31
Curriculum development	1.96	12	14	2	31
Recruiting undergraduate students	1.90	10	12	2	32
Tax exempt status of the institution	1.90	-1	4	5	38

[a] Influence Score calculated as the mean (of all responses) of the rating of the degree of influence each of 44 motivational factors had upon "discussions and/or decisions...with regard to considering increasing economic development activity at your institution within the past three (3) years?" (1, no influence to 5, great influence).

[b] Encouragement Score indicates the degree to which the motivational factor encouraged (+1), discouraged (-1), or was neutral (0) with regard to consideration of increasing institutional involvement in economic development activity.

NOTE: When the 51 institutions were also asked to characterize the level for their institution's economic development activity during the preceding 3 years, 44 indicated it had been increasing; 4 stable; 5 decreasing; 2 other.

industry sponsored research appear to be among the most influential. Factors related to curriculum, student recruitment, teaching, faculty publishing and revenue generation through commercialization were seen to have little or no influence on decisions related to the level of the institution's involvement in economic development.

Encouragement score. The degree to which the 44 factors encouraged increased economic development involvement also varied greatly (as indicated by the Encouragement Scores ranging from a high of 45 to a low of -1 in Table 6). Those factors perceived as more influential were generally also seen as supportive of increased "involvement". An exception was business leaders' point of view, reported to be very encouraging yet of limited influence.

Although few factors were rated as discouraging by more than two or three institutions, there were several perceived to be so by a greater number of institutions: potential liabilities of commercialization (13), academic freedom/freedom of inquiry (11), increasing faculty publishing (7), proprietary rights/secrecy (6) and tax exempt status of the institution (5). As would be expected, as factors were rated less influential they were also seen as more neutral (rather than encouraging or discouraging).

Composite factors. Respondents were also asked to identify separately the three factors which they believed to be "most persuasive or compelling" in encouraging (and the three most persuasive/compelling in discouraging) a greater level of involvement in economic development. Open-ended responses were grouped as composite factors,

shown in Tables 7 and 8.

Factors cited most often to be encouraging greater institutional involvement in economic development formed a composite factor of perceived link with increased institutional funding (45%). Linkage with (and encouragement from) industry, and administration/board encouragement to become involved in economic development were also cited with some frequency (13% and 16% respectively, Table 7). The composite factors seen as encouraging (Table 7) paralleled closely the individual factors rated as encouraging (Table 6).

However, when asked to select the most persuasive factors discouraging economic development activity, the open-ended responses contributed several composite factors (Table 8) not well identified in the detailed listing of 44 factors (Table 6). Insufficient resources (25% of factors cited), faculty opposition or apathy (19%), conflict with the academic culture and its values (13%) and lack of leadership/policy/experience (13%) were among those cited most frequently.

Discussion

The tentative findings of this study suggest that decisions by colleges and universities to become involved in economic development activity are complex. The literature indicates that the activities in which such institutions engage with the intention of having impact upon economic development are numerous, although only those associated with cooperative research and technology exchange were employed in the present study. No single factor nor common set of factors were

TABLE 7

Predominate Composite Factors Reported to Encourage Greater Institutional Involvement in Economic Development Activities

Factor	Frequency (N=144) [a]	%
Economic prosperity perceived as linked to increased institution funding	65	45
Campus administration/board encouragement	22	16
Industry encouragement, linkage	19	13
Land grant (public service) mission	12	8
Faculty opportunity, development	10	7
Enhanced research, technology transfer	9	6
Other (available land, program enhancement, etc.	7	5

[a] N= Total number of factors cited by 51 (72%) usable responses when asked to select the "three most persuasive or compelling".

TABLE 8

Predominate Composite Factors Reported to Discourage Greater Institutional Involvement in Economic Development Activities

Factor	Frequency (N=124) [a]	%
Insufficient resources	31	24
Faculty apathy, opposition	24	19
Conflict with academic culture, values	16	13
Lack of leadership, facilitative policy, experience	16	13
Competing priorities, missions	15	12
Public opposition, apathy	14	11
Other (legal issues, campus isolation, etc.)	8	7

[a] N= Total number of factors cited by 51 (72%) usable responses when asked to select the "three most persuasive or compelling".

identified as influencing decision making on this topic. Yet the involvement of land grant institutions in modern economic development does appear to be increasing among an overwhelming majority of these institutions.

One of the strongest motivating factors for such involvement appears to be the perception that increased economic development activity will improve the position of the institution with regard to general appropriations from government and other sources of funding. The literature review, data collection and data analysis undertaken in this study did not assist in validating or rejecting this assumption: it remains unclear as to whether increased involvement does (or will) improve funding generally.

A chicken-and-egg dilemma may exist with regard to funding, at least categorical funding to stimulate economic development activity. Insufficient resources led the list of composite factors discouraging increased "involvement". This finding, coupled with the link many institutions' seem to perceive between more involvement and increased funding, suggests that state policy intended to stimulate economic development activity among higher education institutions should include a funding component.

The findings of the present study essentially agree with an NSF sponsored research project reported in 1983 [20] and the AASCU sponsored survey reported in 1986 [23] which each cited factors associated with resource-building as comparatively important. However, tentative findings here do not support the NSF sponsored study [20]

findings that exposing students to real-world research problems and better overall training for graduates are key motivating factors.

Summary

American colleges and universities do indeed appear to be increasingly involved in economic development activities. Because land grant institutions share a somewhat common charter mission which emphasizes public service the degree and nature of their involvement in economic development may not be representative of other institutions. The range of responses reported here, however, indicates that factors which influence such involvement varies to a considerable extent. This suggests that institutional decision makers will consider the nature and level of their involvement in terms of the unique conditions of their institution and locale. Additional study of this area, in particular with regard to the alleged linkage between increased economic development involvement and expanded funding, would be of great assistance to institutional leaders.

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